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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/669,784	09/25/2000	Gordon Israelson	00P7919US	3754

7590 04/23/2002

Siemens Corporation
Intellectual Property Department
186 Wood Avenue South
Iselin, NJ 08830

EXAMINER

YUAN, DAH WEI D

ART UNIT	PAPER NUMBER
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1745

DATE MAILED: 04/23/2002

7

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/669,784

Applicant(s)

ISRAELSON, GORDON

Examiner

Dah-Wei D. Yuan

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

**DESULFURIZATION FOR FUEL CELL SYSTEMS USING
SULFUR SEPARATING MEMBRANES**

Examiner: Yuan S.N. 09/669,784 Art Unit: 1745 April 15, 2002

Detailed Action

1. The Applicant's amendment filed on March 11, 2002 was received. Claims 11-20 were added.
2. The text of those sections of Title 35, U.S.C. code not included in this action can be found in the prior Office Action (Paper No. 3).

Claim Rejections - 35 USC § 112

3. The claim rejections under 35 U.S.C. 112, second paragraph, on claims 1,7,10 are withdrawn, because Applicant's arguments are persuasive.
4. Claim 15 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The limitations "the gas flow" and "the gas pressure" are not clear what they refer to . It is suggested that the phrases change to "a gas flow" and "a gas pressure".

Claim Rejections - 35 USC § 103

5. The claim rejections under 35 U.S.C. 103(a) as unpatentable over Carnell et al. and Preston, Jr. on claims 1-10 are withdrawn, because Applicant's arguments are persuasive.

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6. Claims 1-3,5-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Willis (GB 2,289,286A) in view of Preston, Jr. (US 4,202,865).

Willis teaches a process to remove hydrogen sulphide from gas. A natural gas stream containing hydrogen sulphide is subjected to membrane separation to divide the stream into a minor permeate (sulfur concentrated) stream of increased hydrogen sulphide content, and a major impermeate (sulfur lean) stream of decreased hydrogen sulphide content. Prior to the membrane separation step, the gas stream is pressurized to be in the range 10-100 bar abs (1000-10,000 kPa). Typical membrane materials used include polysulphones, cellulose acetate, polyimides, polycarbonates, polyamides, polyetherimides and sulphonated polysulphones. The permeated stream is treated with a regenerable liquid (amine wash) to reduce its hydrogen sulphide content to form a first product stream. The impermeate stream is treated with a non-regenerable solid hydrogen sulphide absorbent, such as zinc oxide, to give a second product stream. The first and second product streams are then combined (i.e., passing the sulfur concentrated stream to the main feed stream downstream from the separation membrane). It is found that 87% of the hydrogen sulphide is removed by the amine wash step yet the gas flow rate therethrough is only 29% of the feed gas flow rate, i.e., gas flow rates are measured in the process. Typically the second product stream, i.e., the effluent from the solid, non-regenerable absorbent treatment stage, has a hydrogen content below 1 ppm and is then mixed with the first product stream, i.e., the product from the regenerable liquid treatment stage. See Abstract, Page 2, Lines 28-32; Page 4, Lines 17-24; Page 5, Lines 1-3,12-14. However, Willis does not teach

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the use of the resulting feed fuel for a fuel cell system. Preston, Jr. discloses that reduction in the sulphur content in the fuel feed is desirable for economic considerations relative to the life and performance of the steam reform reactor catalyst in fuel cell power plants. See Column 1, Lines 15-25. Therefore, it would have been obvious to one of ordinary skill in the art to operate fuel cell power plants using a desulphurized natural gas as the feed for the reforming operation, because Preston, Jr. teaches low sulphur content is critical for the life and performance of the power plant. In addition, the disclosure of Willis differs from Applicant's claims in that Willis does not specifically discuss the sulfur lean stream containing no more than 0.2 ppm of sulfur compounds. It is the position of the examiner that the criticality on the sulphur content after the membrane separation does not provide patentable distinction. In particular, the membranes used in the Willis reference are similar to those cited in the instant specification. Similarly, the criticality on the sulphur content in the sulfur lean stream does not provide patentable distinction because similar sulphur absorbents are used.

7. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Willis and Preston, Jr. as applied to claims 1-3,5-20 above, and further in view of Carnell et al. (US 4,978,439).

Willis and Preston, Jr. disclose a method of reducing the hydrogen sulphide concentration in a fuel gas used as feed fuel for a fuel cell system as described above in Paragraph 6. The disclosure of Willis and Preston, Jr. differs from Applicant's claims in that Willis and Preston, Jr. does not specify the odorous sulfur compound in the feed stream. Carnell et al. define the organic sulphur compounds as comprising hydrogen sulphide, carbonyl sulphide, carbon

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disulphide, methyl mercaptan, diethyl sulphide, and tetrahydrothiophene. See Column 6, Lines 44-48. Therefore, it would have been obvious to one of ordinary skill in the art to use the method of treating a sulphur containing fuel gas disclosed by Willis and Preston, Jr. on an odorous sulfur compounds such as mercaptan, diethyl sulphide, tetrahydrothiophene and mixtures thereof, because Carnell et al. teach all these sulfur-containing compounds are functionally equivalent to the hydrogen sulphide.

Conclusion

8. Applicant's submission of an information disclosure statement under 37 CFR 1.97(c) with the fee set forth in 37 CFR 1.17(p) on March 11, 2002 prompted the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 609(B)(2)(i). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dah-Wei D. Yuan whose telephone number is (703) 308-0766. The examiner can normally be reached on Monday-Friday (8:00-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan, can be reached on (703) 308-2383. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-2340.

Dah-Wei D. Yuan
April 15, 2002


CAROL CHANEY
PRIMARY EXAMINER